SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION

$5 a Year 15c a Copy April 12, 1930

STATESMAN OF PUBLIC HEALTH

World Celebrates His Eightieth Birthday

(*See page* 235)

Vol. XVII *No.* 470

Earth's Attraction Being Measured

Physics

Accurate Figures Will Aid Prospectors and Surveyors

EXACT determination of the force of the earth's attraction now in progress at the U. S. Bureau of Standards will make the United States independent of Germany in a few years in knowledge of how hard the earth pulls things toward it. Speaking in a Science Service radio talk over the Columbia Broadcasting System, Dr. Paul R. Heyl told of the work, which is under his charge. Dr. Heyl's determination during the last few years of the "constant of gravity," frim which scientists calculate the mass, or "weight," of the earth, is the most accurate that has yet been made.

The new measurement of the absolute value of gravity is being made to an accuracy of within one part in a million. It will help the surveyors of the Coast and Geodetic Survey to map the country more accurately than ever before.

"The surveying of large areas differs from small scale work in that the curvature of the earth must be taken into account," Dr. Heyl explained. "It is not sufficient to assume that the surface is spherically curved, even on the Great Plains. One of the best ways of determining the change of curvature of the earth's surface is by the variation in the pull of gravity at different places. Where we are farther from the earth's center, the pull is less. But since such departures from spherical form are always very small compared to the size of the earth, we must be able to measure gravity very accurately indeed if the results are to be useful.

"Determinations of gravity are made throughout the United States on a comparative or relative basis, with reference to a base station, where the value of gravity should be known to as high an accuracy as possible. While it is a comparatively simple matter to compare different values of gravity with one another it is quite another thing to determine the absolute value of gravity at the base station.

"It happens that our Coast Survey has never had a real base station for gravity in this country. The measurements throughout the land have been compared, it is true, with the value of gravity at Washington, but the value at Washington traces its pedigree from the absolute gravity station at Potsdam in Germany. It is by no means as simple a matter as it appears to extend comparisons of gravity across the ocean, and without a base station of our own we are not quite sure of our ground. The experiments now in progress at the Bureau of Standards are for the purpose of establishing such a base station in our own country."

One very practical use of gravity measurements is in locating valuable deposits of oil and minerals.

"The pull of gravity may vary because of the nature of the material beneath the surface at different places," he said. "Perhaps there may be underground a large body of rather heavy rock, or again there may be a deposit of oil, very much lighter than the average crust of the earth, and consequently less attractive (from a gravitational point of view). Many an oil well has been discovered in this way; but it will be obvious that if the deposit is very deep it will require great precision in our gravity measurements to detect its presence.

"How is the pull of the earth measured? There are several ways in which it can be done more or less roughly, such as by the use of a spring scale, or by measuring the speed attained by a falling body, but the most precise way is by means of a pendulum.

"A pendulum swings because of the earth's attraction. Draw its bob to one side and release it; the earth tries to draw it vertically downward, but being rigidly connected to its point of support the only thing the bob can do is to move downward along a circular path. At the bottom of its swing, having acquired considerable momentum, it rises along another arc of a circle, gravity acting against it all the while, and eventually bringing it to rest. The cycle of motion is then repeated.

"The time of swing of a pendulum is determined by two things: the force of gravity and the length of the pendulum. Consequently, if we measure the length of the pendulum and determine its time of swing we can calculate the value of gravity.

"Both these measurements of length and time are capable of being carried out with a high degree of precision, and in consequence no other method of determining gravity can approach the accuracy of the pendulum. But to ensure precision many precautions must be taken.

Science News-Letter, April 12, 1930

The Answer Is

In This Issue

How can a *pendulum* be used to detect *oil?* p. 226—What do 16 of the most prominent *engineers* say about the *future* of their profession? p. 227—How is Italy *solving* the high-speed *interurban* highway problem? p. 227—How would *engineering* progress enable more people to *enjoy* art? p. 227—What was one of the *first* chemical *industries?* p. 229—What product of the *South* is used in *shatterproof* glass? p. 229—What causes *backhand* writing p. 230—How does *sex* affect handwriting? p. 230—What is *Everdur?* p. 232—How is a *"mutt"* superior to a *pedigreed* dog? p. 232—Whose advice was *responsible* for creating the *Yellow Fever* Commission? p. 235—What use do we *make* of 100,000,000 *gallons* of alcohol? p. 239—How does a *plant* react toward *color?* p. 239.

SCIENCE NEWS-LETTER, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by Watson Davis.

Publication Office, 1918 Harford Ave., Baltimore, Md. Editorial and Executive Office, 21st and B Sts., N. W., Washington, D. C. Address all communications to Washington, D. C. Cable address: Scienserve, Washington.

Entered as second class matter October 1, 1926, at the postoffice at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. Patent Office.

Subscription rate—$5.00 a year postpaid. 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Special reduced subscription rates are available to members of the American Association for the Advancement of Science.

In requesting change of address, please give old as well as new address.

Advertising rates furnished on application.

America's Machine Age Has A Birthday

Engineering

AMERICA'S machine age, symbolized by the American Society of Mechanical Engineers, celebrated its fiftieth anniversary this week.

Sixteen of the foremost engineers of the world from as many countries described the influence of engineering upon the life of the people in their parts of the world, and were awarded the fiftieth anniversary medal, designed by Julio Kilenyi, portrait sculptor.

The United States was represented by Dr. C. E. Grunsky, president of the American Engineering Council, and Great Britain by Loughnan St. L. Pendred, editor of *The Engineer*. Other countries and their representatives were: Canada, Brig. Gen. C. H. Mitchell, dean of the faculty of applied science of the University of Toronto; Germany, Dr. Ing. Conrad Matschoss; France, Georges Claude; Japan, Dr. Masawo Kamo, of the Tokyo Imperial University; and Italy, Senator Luigi Luiggi.

South America's representatives were Prof. Donato Gaminara, of Uruguay, a member of the Pan-American highway commission, and Prof. Julio Garzon Nieto, a chief engineer with the Colombian government. From Austria, Hofrat Ing. L. Erhard, director of Technisches Museum, Vienna; from Belgium, Monsieur le Baron Gaston de Bethune, representing six eminent engineers; from The Netherlands, Prof. Ir. D. Dresden; from Scandinavia, Vilhelm Nordstrom, of Stockholm, Sweden; and from Switzerland, Prof. Dr. Aurel Stodola; from Czechoslovakia, Dr. Stan. Spacek; from Mexico, Senor Ing. Norberto Dominguez.

Herbert Hoover, Engineer-President, and Orville Wright, first to fly an airplane, were awarded medals.

President Hoover was the first recipient of the medal named in his honor, the Hoover Gold Medal, the gift of four leading engineering societies in recognition of his humanitarian services. The Gugenheim Medal "for notable achievement in the advancement of aeronautics" was given Wright.

The American Society of Mechanical Engineers Medal was presented William LeRoy Emmet, of the General Electric Company, for his contributions in the development of the steam turbine and the electric propulsion of ships. The Gantt Medal went to Fred J. Miller, former editor of the *American Machinist*, for achievement in scientific management.

Humbly Proud

Charles Piez, president of the American Society of Mechanical Engineers:

We are humbly proud of the fifty years of progress in mechanical engineering which this anniversary commemorates. Our colleagues and our predecessors have multiplied the conveniences of power of transportation, and of countless mechanical devices that have released human efforts for the accomplishment of larger purposes. They have made their contributions to the establishment of higher standards of living.

The spirit of this occasion is one of opportunity and obligation; opportunity to give the world the essential elements of the universal prosperity of which it has always dreamed; obligation to approach this task with a realization of the hardship it may bring to those unprepared for rapid changes in economic life, and to accomplish it without offense to the aesthetic and spiritual natures of educated people.

The method of engineering is to measure the facts and to build upon them; its purpose is to control the elements of man's environment, directing natural forces constructive to his welfare; its philosophy is the spirit of progress; its future usefulness will increase with a growth of knowledge and unselfishness; its faith is summed up in the inscription on the Fiftieth Anniversary medal: "What is not yet, may be."

United States

C. E. Grinsky, president of the American Engineering Council:

The use of machinery and of appliances to reduce manual labor will be further increased. There will be more time for study and recreation. With the decrease in the relative number of those who are producers of the food, clothing, shelter and other things that are considered essential for well being and comfort, there will be an increase in the number of those engaged in research work in teaching, in art, music, and literature. There will be vastly increased activity in the construction, operation and care of public works. There will be carefully directed effort to secure at public expense a conservation of natural resources particularly of the water of the lakes and streams. There will be great improvement in down-town traffic facilities with much substitution of large capacity busses for the cars on rails. The removal of street cars and the substitution of welding for riveting will go far toward the elimination of the (*Turn to next page*)

offensive and disturbing down-town noise. There will be aviation fields conveniently located near every populated area and aerial transportation opportunity across the whole breadth of the country within 24 hours. There will be reels of photographed speech, and song, and music, so that entire operas and books may be listened to without leaving the home. Elimination of drudgery in the home will be brought within reach of all and, so too, light with all the properties and virtues of sunlight. Purified and tempered air will add to the attractiveness and comforts of home life, perhaps, indeed, persuading the masses that single family houses are to be preferred to apartments. And there will be a thousand other things, with the engineer in the background, which will exert a profound influence on the structure of society—an influence, let us hope, making in the main for more comfort, more happiness and for constant improvement in living conditions, the world over.

Great Britain

Loughnan St. L. Pendred, president of the Institution of Mechanical Engineers:

Another world to conquor lies open before the engineer. He has ministered, and will continue to minister, to the material wants of men, but something far far greater lies before him. It is not for him, perchance, in his vocation to peer into the "soul of things", but through him the attainment of that glorious abstraction may be made easier. He has brought men together and can bring them closer yet; he can knit the whole world into a single unit; he can remove the frontiers of the land, the sea and the air, and hasten the coming of a common tongue, a common understanding and a common will to good. With him, and him alone, rests the power to make war or preserve peace. He can decrease labour and increase leisure. He is the great educator. He can take men to see the wonders of the world abroad; he can diffuse great literature; he can bring the voice of great thinkers to the fire-sides of the humblest. Literature, music, art, and philosophy are in his train.

Germany

Prof. Dr. Ing. Conrad Matschoss, secretary of Verein Deutscher Ingenieure:

There was a time when the saying "Knowledge is Power" was in everybody's mouth, and was a household belief. Today we know that the knowledge unaccompanied by the ability to put it into practice is often no better than a dead weight which one has to carry about. One can be so full of knowledge that one is absolutely useless for anything else in the world. We have rightly placed practice in the foreground, and we know today that the character of the individual decides his success or failure in every profession. We do not believe that it is possible to form the character by systematic education, but we do believe that the school should give one an opportunity of bringing out what is already in the pupil.

Engineering and natural science have created a new age into which we, with our short span of life, have been transplanted.

Philosophical considerations and intellectual reflections are not enough to remould the world and to guide our confused civilization into the right paths. Here we need the will to decide and to act. We must recognize—to use the language of science—that there is no question here of a reversible process. There can be no going back to any imaginary good old time. We must strive to master the problem of man and machinery. We need a belief in a civilization in the future. It is not sufficient to be satisfied with improving machinery. Is "the increasing deterioration of human character," designated by the French philosopher LeBon in 1910 as a sign of the times, a real fact? The nerves of man cannot stand the pace of modern civilization, the new achievements have not been digested, salvation can only come by adapting ourselves to the new world around us. We must try to reawaken in mankind the love of work for its own sake, and we must realize that work in itself counts as one of the greatest moral forces in the world.

France

From a report by a number of French engineers:

Collaboration is the more effective as it extends to the work of a much larger number of engineers and to work accomplished in all countries. Indeed every discovery made by one of the searchers opens to all the others a new field for exploration or a more effective means for action which multiplies the possibilities that are open to all.

Canada

Brig. Gen. C. H. Mitchell:

Each country or region in which engineering is carried on, demands design, construction, and operation of engineering works in conformity with the characteristics of the country. These governing characteristics are both physical and human; they depend upon geography, climate, and natural resources, and above all, upon the habits and customs of the peoples in their tendencies and requirements of life and business.

Canada has conditions and requirements which are peculiar to the country in all these respects. Canadian engineering has, therefore, become and has remained distinctive and has definitely acquired its own qualities and characteristics.

Japan

Dr. Masawo Kamo of Tokyo Imperial University:

Half a century ago, Japan was an insignificant island nation of the Far East, its doors closed against the world, organized according to a feudal system, possessing a civilization which paid scant heed to mechanical and other material progress. Today Japan is considered a first class power and is steadily marching to a leading position among the industrial nations of the world.

These changes are largely attributable to engineering. In fact, we may say that the progress of Japan in the past five decades has been the progress of engineering in Japan.

Although Japan remains to a large degree dependent upon agriculture, with 55% of its inhabitants on the farms, no fewer than 21% are engaged in engineering and associated pursuits and the whole of the Empire's natural resources are mobilized for the benefit of the people as a whole.

Italy

Prof. Dr. Ing. Luigi Luiggi:

Modern roads for rapid transit are very costly to build and maintain therefore although Roman builders were famous for their roads, Italian engineers are faced with economic facts, and roads (*Turn to page* 236)

Chemistry, Godmother of the South

Chemistry

Makes Agriculture and Industry Thrive Side by Side

From all parts of the United States chemists went to Atlanta on April 7-11 to hear reviews and predictions of the part their profession is taking in the industrial arousing of the South, for the South with her industries formed the central theme of the spring meeting of the American Chemical Society. The most interesting achievements reported are described on this page and on page 237.

CHEMISTRY is the fairy godmother that is changing the old agricultural South into the industrial giant of the new arousing.

This was the keynote of the spring meeting of the American Chemical Society, attended by a considerable proportion of its 17,000 members, who heard from Southern chemists and saw in the industrial plants in and around Atlanta the story of the chemical metamorphosis of the South.

Chemistry has touched and transformed many of the classic products of the South: cotton, sugar-cane, wood products, rosin and turpentine. A classical example is found in sugar-cane, whose crushed fiber, or bagasse, now goes into millions of board feet of artificial lumber; this new wall-board industry has caused the cultivation of cane primarily for the fiber, so that the former principal product, sugar, has now become the by-product in certain cane-growing regions.

One of the first of all modern chemical industries, the manufacture of synthetic indigo, ruined a Southern plantation industry, the cultivation of natural indigo. Now, however, "time brings its revenges" to the South, for the hills of the Carolinas, Virginia and Tennessee have become the home of a large sector of the newer textile industry, which absorbs vast quantities of the products of the now vastly developed synthetic dyestuff trade.

But in promoting industry chemistry is not threatening to abolish agriculture. It is doing quite the contrary for the rural South. It is promoting agriculture as well as industry partly by finding new uses for agricultural products and partly by assisting in bringing them into being and protecting them from their natural enemies. Because of the help chemistry has been to industry in the South, that section has contracted a debt to the science which it can pay only by whole-hearted encouragement and generous support of chemical education and research, said Dr. Harrison E. Howe, editor of *Industrial and Engineering Chemistry*.

Dr. Howe has just finished an 11,000-mile survey tour, during which he visited numerous industrial plants, educational institutions and research laboratories where chemistry plays an important part in the program. He is convinced that now is the time when chemistry should be most strongly encouraged, not only for the speedier ending of present industrial sag but for the upbuilding of the greater era of prosperity which is to follow.

GOOD food for human beings will come from parts of cotton seed now fed to cattle and hogs, or even wasted. So predicted a New York chemist, David Wesson.

"A cotton crop of fifteen million bales furnishes the oil mills with five million tons of seed," he said. "This seed produces, under present methods of manufacture, 308 pounds of oil per ton of seed, or 13 pounds of fat for each inhabitant of the United States. Improving manufacturing methods would yield 20 per cent. more oil and allow the utilization of the 900,000 tons of protein present in the seed for human food, supplying approximately one-half the protein needs of the country." Cotton seeds will soon be shaved even closer to increase the supply of a raw material which just a few years ago was a complete waste but is now used to make a variety of products from non-shatterable glass to artificial silk.

This is what W. Donald Munson, of Chattanooga, Tenn., said about cotton linters, the short fibers left on the seed after ginning. They are now removed in a delinting machine in which the cotton seed comes in contact with saws revolving at high speed to take away the short fibers.

The demands of the industries employing cotton cellulose as a base has increased so rapidly since the World War that cheaper methods of production will doubtless be developed and the shorter fibers now left on the seed utilized, it was pointed out.

RESEARCH has made possible the production of a large portion of the annual turpentine and rosin yield in the southeastern states from pine stumps instead of full-grown trees, Brian S. Brown, Savannah, Ga., reported.

Early methods practiced until the beginning of the present century were fatal to trees, Mr. Brown said. Then the external cup to catch the gum replaced the internal cup. Now improved methods of chipping trees, increasing fire protection and rapid growth of slash pine insure practically unlimited future supplies of rosin and turpentine.

ALTHOUGH the manufacture of artificial silk and wool has increased enormously during recent years, the production of the synthetic fibers in 1929 was less than four per cent. that of the natural fibers, Prof. Charles E. Mullin, of Clemson College, S. C., said.

Prof. Mullin also predicted that the 1930 output of synthetic yarns will exceed the million and a quarter pounds of last year by more than 30 per cent., and he added that the saturation point today is as far off as it was 10 years ago. The growth of the artificial silk industry has been the most spectacular of Virginia's recent developments, Professors Robert E. Hussey and Philip C. Scherer, of the Virginia Polytechnic Institute, declared. "Starting in 1917 with one small plant the industry has grown until now the estimated output for 1930 will be 28 per cent. of the total United States production or about 10 per cent. of the world production," they said.

CALCIUM gluconate, a chemical made by the action of moulds once thought good for nothing but spoiling things, is a valuable addition to the feed of milch cows, experiments conducted by W. A. Turner, E. A. Kane and W. S. Hale, of the U. S. Department of Agriculture, show.

Calcium gluconate is a compound of gluconic acid, which is now made experimentally in quantities in the Department of Agriculture laboratories at Arlington, Va. A few years ago it was worth over $100 a pound, when it could be had at all; now its cost is down to about 35 cents a pound. This makes possible experiments looking toward its eventual practical use.

The calcium gluconate was added to the feed of the cows as a possible source of additional lime for their blood and also for their milk. Lime salts are among the valuable mineral constituents needed in milk, especially in milk fed to young children.

Debunking the Handwriting Experts

Psychology

Graphology Found to Have Some Truth, Much Error

By Emily Davis

WHEN you sign your name with a flourish or with a steady, pushing evenness, you are telling the world something about yourself—but what?

Science sees no good in attempts to read character in the bumps on one's head. It refuses to believe that red-haired people are by inference fiery tempered. Nevertheless science cautiously thinks that there may be something significant in handwriting. Rather slowly and quietly these significant facts about handwriting in relation to personality are being discovered. The scientific discoveries are sweeping away the glib character readings of the handwriting fortune teller and replacing these untested ideas with provable facts.

One of the psychologists who is doing much to put the science of handwriting on solid ground is a woman, Dr. June Downey, professor of psychology at the University of Wyoming. At a recent meeting of psychologists Dr. Downey reported to an interested audience her latest discoveries as to what it means to write backhand.

Now, graphologists, who read character from handwriting, have always maintained that the slant of your handwriting is a barometer of your emotional traits: If you write a straightly vertical hand you are thereby expressing yourself as a person of normal emotional make-up, not readily excitable, moderately responsive. If your handwriting slants far forward it is supposed to betoken eagerness, warm affection, whereas a slant to the left indicates reserve and coldness, an anti-social nature.

Psychologists long ago pointed out a feeble link in this line of reasoning, for left-handed people are most frequently addicted to back-hand writing, and surely left-handedness does not imply a chilly attitude toward the world. Still, there remained to be accounted for a large number of right-handed people who push a backhand pen.

Dr. Downey wondered if these right-handed individuals could be left-handers in disguise. She questioned about 700 of her right-handed acquaintances and found that four per cent. of them wrote backhand. At the meeting she reported

to the psychologists that she has analyzed 45 of these supposedly right-handed back-hand writers, and has found that some of them had been left-handed babies who were taught to use the right hand. Some were ambidextrous, using both hands for skilled tasks. Fully 60 per cent. of the back-hand writers had a dominant left eye or else they depended on the two eyes impartially.

Hence, an urge to write back-hand need not alarm you with the fear that you may thereby betray a heartless and chilly nature. It means more probably that you have a tendency to be left-handed, which may have been long ago suppressed by well-meaning parents, or more probably still you have a tendency to be left-eyed.

The child who persists in writing back-hand in spite of school fashions in penmanship is seeking to attain a harmony of movement in accordance with his own psychological traits, Dr. Downey reported to the group of psychologists. In the same way, the child who is right-handed naturally slants his writing forward, because the centrifugal force within him works most readily in that direction.

"Personality is the most complicated problem that any psychologist can approach," Dr. Downey declared in an interview following the meeting where this announcement was made. "Yet the quest for short cuts to personality goes on, for the greatest of all sports is reading people.

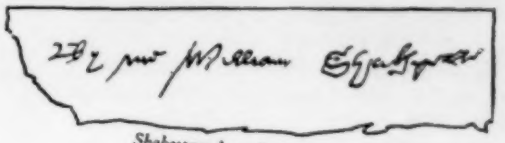
"There is no denying that it would be profitable for us in our dealings with bankers, voters, landladies, and rich old relatives, if we could find an infallible gauge of their characters by noticing the ways in which *i*'s are dotted or *t*'s crossed. But graphology can never become scientific, that is to say reliable, unless it is built on a firm foundation of scientific psychology. At present the psychological information of the graphologist is a thing of shreds and patches.

"Often the graphologist proceeds by the easy way of superficial analogy and argues that the individual who puts generous flourishes on his g's will also be generous in his dealings with his neighbor, or asserts that loops running high above the base line indicate aspiration, and that loops extending far below the line show materialistic tendencies.

"Such deduction fails to analyze the writing movement. It does not explain how a motor habit can be an index to a mental disposition. Nor does it satisfactorily link graphic speed, rhythm, and form with phases of personality, for very little is known positively about these matters."

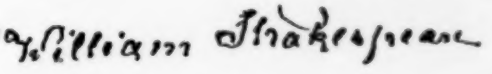
The complexity of the problem has been shown by evidence that a trait of handwriting, such as large letters, may be due to a variety of causes. Some people write large because of bad eyesight, others because of mental disease, or from a habit developed through imitating some one else's dashing style. Further, it has been found that an individual's writing varies from day to day with the effects of weariness, excitement, weather conditions, lighting arrangements, unconscious imitation, or drugs.

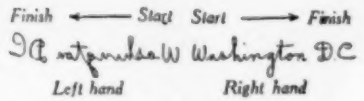
Still, Dr. Downey and other psychologists believe that there may be some law and order in handwriting as an expression of inner conditions, and they are proceeding to test out assumptions of graphology with the expectation that some day a usable set of facts may be developed. Dr. Downey adds cautiously, however,



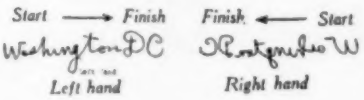
Shakespeare's real signature

After three weeks' drinking a man wrote Shakespeare's name as shown above . . . but after taking the cure, the man wrote the signature shown below proving Shakespeare did not die of alcoholism





An easy way to write with both hands simultaneously



The hard way to write with both hands simultaneously

Shakespeare's writing shows signs of the disease which probably caused his death. Note the irregularities, the jerky tremor, and confused ending of the signature above. His strange fist was not due to alcoholism. The name Shapespeare written by patients suffering from this malady is very different. *(Courtesy "Problems of Personality; Studies in Honor of Morton Prince.")*

that penmanship may be a lost art before handwriting is understood sufficiently to form a really serviceable code to character.

As Dr. Downey and other scientists have tested some of the ideas of graphology, they have blasted a good many of the most widely accepted notions. Their studies of handwriting in comparison with the personalities of many people reveal that heavy strokes of the pen do not necessarily go with a forceful personality. Nor can upsloping lines of writing safely be interpreted as an outward sign of confidence or ambition. Nor do people who cross their *t*'s with long bars have plenty of perseverance. It follows that employers seeking go-getter salesmen would take a long chance in relying on impressive signatures of applicants.

On the other hand, Dr. Downey did find that people who are preoccupied with details are apt to turn out small, fine writing. She also found that people with what she terms "explosive" temperament, that is, readily expressive persons, have a style of writing that is more light and flowing than people who are "inhibitive," or over-repressed, by temperament. This particular finding she considers the most promising discovery of temperament as expressed in handwriting so far made.

Alfred Binet, noted French psychologist, gained the confidence of graphologists sufficiently to test their success and failure in reading certain facts from handwriting.

Dr. June Downey, who finds that right-handed people slant their writing forward, and left-handed people slant back because the twist of the body is more natural.

"His experiments show that one can guess the age of a penman within about ten years from his writing," Dr. Downey said. "But the possibility of ten years' error in the ordinary lifetime range of three score years and ten would render this diagnosis of age valueless in any practical situation, such as estimating the age of a kidnapper or a thief who might have left an incriminating note."

In the course of a lifetime, an individual goes through four general stages of handwriting: crude learning; then stereotyped school penmanship; then greater variation and originality; and, finally, in old age a weakened script with tremors, perhaps, indicative of weak muscular control, or with large lettering more easily to be seen by failing eyes.

One difficulty in reading an individual's age precisely from his writing is that some people continue to write a childish fist long after they are away from all copybook influences. This does not mean that they are immature, Dr. Downey explained. Far from it. Intellectually precocious young men with this peculiarity have come to her attention. She tentatively explains their cases by suggesting that people whose writing matures late are of a "sensory makeup." They are of the thinking, inactive type which is sensitive to the impressions of sight, hearing, and touch, from the outer world, and which is more likely to excel at brain work than at physical skill. Those whose writing matures early, on the contrary, are of a "motor makeup," she believes. These would be people of an active type, using the hands and the rest of the body with ease and skill.

"Binet and other investigators have also shown that one can tell the sex of a penman with considerable accuracy," Dr. Downey continued. "They call attention, however, to the fact that there are some women who write a distinctly masculine hand, and a few men who write a feminine hand. An occasional individual writes what we may call a sexless hand."

It is a debatable point, she believes, the degree to which sex in handwriting is due to inner traits of the penman or to the outer influence of social codes. Society looks indulgently upon a scrawling male signature, and charitably ascribes such writing to genius. But women are expected to write a neat and pleasing script, and usually make an effort to do so, she points out.

Your own estimate of age and sex based on handwriting is about as good as any "expert's," the experiments indicate. Binet found that experience in studying handwriting did not give an advantage in such judgments. The same was found to be true in a very recent test at a California State Teachers' College. In this case amateur judges gave their opinion of sex represented by penmanship samples, and the guesses ran up a score of two out of three correct. These judges associated with masculine writing such traits as irregularity, uneven form, angles, and individual slant. Feminine writing was characterized by regularity, curves, conventional form, and uniformity.

Curious changes take place in the handwriting of individuals suffering from diseases, and "experts" too hasty to apply a little untested knowledge have not (*Turn to page* 234)

Jewel-Decked Mummy

The undisturbed mummy of an Egyptian woman decked in the jewelry in vogue four thousand years ago has been discovered by the University of Pennsylvania Museum Expedition at Meydum, Egypt.

A report just received from Alan Rowe, director of the excavations, states that the name of the woman is read as "Sat-her-em-Hat." Her adornments include a string of large graded beads of polished amethyst, a string of exquisite miniature amulets cut in carnelian, lapis lazuli, and jasper, and a semi-circular pendant of green and black faience beads.

The mummy is hailed as an unusual find, since so many of the Egyptian tombs have long ago been pillaged for their valuables.

The expedition is still seeking the burial chamber within the great mastabah, or flat-topped-tomb, near the pyramid of the Pharaoh Sneferu. All evidence indicates that the tomb belonged to some important person connected with the royal family, Mr. Rowe states.

Archaeology
Science News-Letter, April 12, 1930

Copper Alloy for Shears

Soft copper, that easily worked metal used extensively for electric wiring and electrical apparatus, has been made into a razor blade that holds its edge and shaves; and scissors that cut thin paper.

Even the ancients had hardened or tempered copper. Razors and shears have been made in past years as curiosities, but it has remained for "us moderns" to make a copper both as hard and as useful as steel.

The two modern hard coppers, Everdur and Tempaloy, were found during searches for something else, a report to the Engineering Foundation reveals. They are as hard as steel, can be machined and worked, and are as strong as much steel now in use; but they will not corrode and rust like the more familiar metal. Research has already developed both for practical application.

Everdur is a product of necessity found by Charles B. Jacobs, of the duPont Company, during the World War when a fairly cheap metal that would withstand the attack of acids was needed in chemical plants.

Mr. Jacobs knew that silicon, which combined with oxygen is so plentiful, as ordinary sand, was being produced in commercial quantities at a reasonable cost. He mixed a little silicon with copper and obtained a good acid-resistant metal. Later researches led to the addition of a small quantity of manganese.

Tempaloy, as its name indicates, undergoes peculiar changes when heated in different ways. When heated to 750 or 800 degrees Centigrade and then chilled, it is soft and ductile and can be readily worked cold.

When held at 450 degrees for a few hours it becomes lastingly hard. In fact, tempaloy is a copper that can be tempered, in the modern phraseology, as steel is tempered.

This alloy is made of copper, silicon and nickel and is the result of researches by Michael G. Corson in the Union Carbon and Carbide research laboratories.

Metallurgy
Science News-Letter, April 12, 1930

Paradoxical

Removing oxygen from a chemical compound by shooting atoms of oxygen at it is the paradoxical result achieved in an experiment by Prof. W. H. Rodebush and W. A. Nichols, Jr., in the Laboratory of Physical Chemistry at the University of Illinois. The effect was produced with the chemical compound known as molybdenum trioxide. Removal of oxygen is called a "reducing action" by chemists. Atoms of hydrogen have a very great attraction for atoms of oxygen and pull them out of compounds to form molecules of water. Hitherto the effect has not been obtainable with oxygen atoms, and this is the first time that oxygen itself has been made to serve as a reducing agent. The experimenters say that with the molybdenum trioxide the effects of hydrogen and oxygen are identical.

Chemistry
Science News-Letter, April 12, 1930

Mental Disease in China

China, which has lagged behind western countries in treating the mentally sick, is now trying to plan modern scientific attention for the million or more insane who go uncared for there. The China Medical Association has unanimously passed a resolution "that there must be adequate treatment for mental cases," Dr. James L. McCartney, of the Connecticut Department of Health, states in a communication to the National Committee for Mental Hygiene. Dr. McCartney has been on the staffs of several medical schools and hospitals in China.

As a first step toward adequate treatment, it has been proposed that an Institute for Mental Hygiene be established in Shanghai. This institute would be a center for training, research, information, and clinical

IN VARIOUS CI

work. Chinese psychiatrists and social workers would thus be trained by modern methods, and in time there would be clinics and hospitals for the mentally ill in various parts of the country.

In the vast area of China there is not a single national government hospital for the care of the mentally sick, Dr. McCartney states. There are several municipal insane asylums where a few hundred psychotics are "herded" together. Missions and one or two other hospitals reach a few more hundred.

"If native Chinese are caught on the street doing anything unusual, they are arrested and thrown into prison as if they were criminals," he explains. "If they are harmless and wander the streets, they are mocked and laughed at, and are often stoned. Most patients are kept chained at home and are not allowed to go abroad, as the head of the Chinese family is usually held responsible for the injurious acts of any of its members."

Except for a few educated persons, the Chinese know nothing of the real nature of a psychosis, Dr. McCartney's statement continues.

Psychiatry
Science News-Letter, April 12, 1930

Super-Dogs

"If especially intelligent dogs were bred to dogs of like intelligence, it would result in the production of super-intelligent dogs."

So believes Dr. W. J. Lentz, director of the small animal clinic of the University of Pennsylvania School of Veterinary Medicine.

"Dog fanciers are not giving the dog a square deal in their neglect of intelligence," he declares. "They breed for certain marked physical characteristics, and in so doing very frequently breed out all the brains. While it is true that the weight and size of the brain does not determine exactly the intelligence, in either man or beast, at the same time a head too narrow to accommodate a brain of adequate size must of necessity denote stupidity."

Dr. Lentz calls especial attention to the degeneration of the police dog's intelligence to give him a "pretty" head. Fanciers of the German shepherd point with pride to the fact that within the last three decades the dog has been "ennobled," selective breeding having lengthened and narrowed the

head and muzzle considerably, as is obvious when prize-winners of today are compared to the types of thirty years ago, when the breed first began to attract attention. Dr. Lentz makes it plain that dog fanciers long ago parted company with scientific men.

Originally the German shepherd was a utilitarian dog, bred for farm work, with little attention being paid to the shape of the skull, but the fanciers soon began to "improve" the animal.

Dr. Lentz has no sympathy with breeders who strive for long narrow heads or any other physical features. He points out that the grayhound is one of the oldest and purest breeds, with a long, narrow head, and yet this dog displays very little intelligence compared to many "mutts."

Many police dogs have earned places for themselves in the movies, but these dogs are very much like the sleek-haired human "sheiks" of the screen. Many little dogs of uncertain origin have done far cleverer things on the stage and in the circus, but these little workers have been forced to yield laurels to good-looking canine actors far less intelligent than themselves.

Dr. Lentz has a warm place in his heart for the "mutt," the little dog with brains, whose skull no fancier has bred into a fantastic shape.

Genetics

Science News-Letter, April 12, 1930

English Physicist Honored

Sir William Bragg, director of the Royal Institution of Great Britain and winner of the Nobel prize in physics, will come to the United States next month to receive the Franklin Medal, awarded by the Franklin Institute. He will be awarded the medal in the hall of the Institute, Philadelphia, on May 21. At the same time another Franklin Medal will be given to Dr. John F. Stevens, who effected the engineering organization for the construction of the Panama Canal and is distinguished for his work in locating, erecting and administering railroads in the United States and foreign countries.

Following his appearance on May 21, when he will acknowledge the medal with a paper on his work, Sir William will lecture at several American universities. On May 23 he will speak at Johns Hopkins University, Baltimore; on May 26 at Columbia University, and at Princeton University on June 2.

On May 30, at 3:45 p. m., eastern time, he will give a radio talk under the auspices of Science Service through the stations of the Columbia Broadcasting System.

Physics

Science News-Letter, April 12, 1930

World Phone Book

An international telephone directory, listing 60,000 European subscribers who talk from one country to another, will make its appearance in Copenhagen in June. It is the third edition of the "Annuaire Telephonique International."

Telephony

Science News-Letter, April 12, 1930

Locusts

Egypt is engaged in furious war against one of the most ancient and dreaded of her enemies, a foe that invaded and devastated in the days of the Pharaohs—locusts. But according to advices received the newest onset of these hordes is now being faced with weapons reminiscent of those of the World War: flame throwers and instruments of chemical combat.

The swarms of locusts, which are coming out of the East, from Trans-Jordania into the Sinai frontier, are literally flying squadrons, and their attacks are like the surprise attacks of war. They are being met as the best teachers of tactics say such attacks should be met, with mobile forces able to bring a maximum concentration of fire to bear on a given area in the least possible time. Concentration of fire in the literal sense, for there are eighteen batteries of flame-throwers mobilized. These meet the enemy on the move, and mow down the swarms that do not show an inclination to settle on the ground.

Where the locusts come to earth, chemical warfare is resorted to. Baits of poisoned food are set out in the open fields, and where the locusts settle on the trees they are assailed with powerful spray pumps hissing forth poison spray.

The casualties are not counted; they are weighed. After one engagement eleven tons of the enemy were carted off dead. Very few prisoners have been taken; only such few hundreds as the government entomologists wished for study. For the rest, there has been no quarter.

Entomology

Science News-Letter, April 12, 1930

From Adrenal Cortex

Within the same week, almost on the same day, two groups of scientists, working separately at different institutions, have announced the extraction of a potent substance from the cortex of the adrenal gland. A report of studies on this important subject by Dr. W. W. Swingle and J. J. Pfiffner of Princeton University appeared in *Science* almost simultaneously with the report made to the American Physiology Society meeting at Chicago by Prof. F. A. Hartman and Dr. K. A. Brownell of the University of Buffalo.

Dr. Swingle and his associate had previously reported the production of adrenal cortex extract, but they have just obtained a watery preparation which is much more powerful than their first extract.

Prof. Hartman and Dr. Brownell of Buffalo call their extract cortin. It is obtained differently.

The cortex, or outer layer, of the adrenal glands is known to be essential to life. When both glands are entirely removed death follows, although a small portion of cortex is sufficient to maintain life. Scientists have been investigating the subject trying to discover whether the cortex has any other functions and also trying to obtain a cortical extract.

Dr. Swingle and his associate removed both glands in a series of cats and then administered their new, watery extract. The cats remained alive in perfectly normal condition up to forty or fifty days. Some were still living after eighty days. They could not be distinguished from normal unoperated cats, and ate, played, fought with one another and kept themselves sleek and clean. Cats which had had both adrenals removed but which received no extract lived only seven days, on the average, the Princeton investigators reported. They believe that they have successfully extracted from the adrenal cortex an active hormone which maintains life in animals that have had both adrenal glands removed.

The Buffalo investigators reported that their extract could safely be injected into human beings, and that it had been given by mouth with beneficial results. These men also worked with animals and found that their extract would prolong life in animals which had no adrenals so that the treated animals lived from two and one-half to three times as long as the untreated animals.

Medicine

Science News-Letter, April 12, 1930

Debunking the Handwriting Experts—*Continued*

hesitated to say that a doctor could diagnose a patient's condition from day to day by examining a current piece of his handwriting sent to the doctor's office.

Mental diseases appear to set a particularly readable stamp on handwriting, Dr. Downey explained. Patients suffering from melancholic depression, a disease marked by sluggish energy, are found to decrease the size of their writing. Patients who are maniacally excited often enlarge their writing to an extraordinary degree, especially during an acute attack of elation. Other mental patients who are victims of delusions decorate their handwriting with elaborate and fantastic flourishes, particularly if they have delusions as to their own grandeur or importance.

"Many autographs of normal people show the same tendency to overelaboration, and one finds difficulty in repressing a s u s p i c i o n that an overelaborated autograph really does indicate a certain amount of preoccupation with one's self or one's career," she commented. So have the flourishes once considered the height of elegance fallen under psychological suspicion!

It would be a rash conservative who would p r e d i c t that tricks of handwriting will never prove to be definite outer symptoms of disease, useful to doctors just as the knee jerk or a peculiar pain is useful as a clue to a disease condition. But so far too little is known about all this for h a n d w r i t i n g to be a reliable barometer for the doctor's medical kit.

If medical graphology is ever put on a firm basis, it may explain some of the mysterious ills from which geniuses and other historic personages have suffered, Dr. Downey believes. Many famous individuals of the past have suffered from maladies which set a stamp on their careers. Often these maladies are hinted at most vaguely in their biographical data, and students are baffled, knowing that the disease might explain mysteries.

Mentioning Shakespeare as an example, Dr. Downey said that Dr. Charles L. Dana, of Cornell University M e d i c a l College, thought he might be able to determine the cause of Shakespeare's death at the early age of fifty-two by studying the six veritable signatures that we possess from the dramatist. The six signatures, all made within three years of his death, show many defects. They have even been cited as the writing of an illiterate man and as one proof that Shakespeare did not write the plays attributed to him.

The fact that Shakespeare wrote Gothic script and not Roman accounts for some of the weirdness, but not all. Scrutinizing the bad form of the historic signatures, Dr. Dana saw evidence of loss of normal control. For a long time, the doctor had his patients write the words "William Shakespeare" in the hope of identifying the pathological signs so evident in the poet's signatures.

His quest was never successful. He did satisfy himself on the negative points that Shakespeare did not show signs of writers' cramp or alcoholism in his writing. Writers' cramp is chiefly a modern disease, which followed the introduction of steel pens, as Dr. Dana knew. But in view of Shakespeare's many plays it was interesting to make sure that he had not overtaxed his writing arm. Alcoholism as we see it was comparatively rare in Elizabethan days, Dr. Dana pointed out, when he reported his work in the volume on "Problems of Personality: Essays in Honor of Morton Prince." Shakespeare's writing is not like modern alcoholics'. Nor did he apparently have paralysis agitans, as Dr. Dana had been inclined to think.

The most that the psychiatrist was able to conclude was that Shakespeare died from some form of vascular disease. His defective signatures would be explained by a clot affecting his left mid-brain, Dr. Dana pointed out.

"There is one form of handwriting which is very strange but not pathological, and which has attracted many psychological experimenters," Dr. Downey pointed out. "This is mirror-writing, so named because it can be easily read by holding it up before a mirror, which restores it to the normal form. To write it, the p e n m a n begins at the right-hand edge of the paper and moves toward the left.

"Parlor vaudeville performers delight their audiences with such maneuvers, but any one who cares to practise can become expert at mirror-writing. It is also possible to write with both hands simultaneously, each moving out from the center or each starting at the edge of the paper and working in. In these experiments, one hand writes normally, the other reverses the script."

If you try these experiments, you will realize the principle which Dr. Downey calls upon to explain mirror-writing. The easiest movements of the body are centrifugal, or out from the body as a center; the hardest are centripetal, or in toward the center, she has found. So, if you are right-handed you will find it hard to write mirror fashion. If you are a left-hander or if you are inclined to be left-handed, it will be much easier. In any case you will find it difficult to start at the two edges of the paper and work in toward the center, for this is a centripetal motion. Because of this principle, mirror-writing is thought to be the natural writing of the left hand. But since normal writing is fixed in a different mold, and s i n c e mirror-writing therefore appears outlandish to most people, the left-handers do the next best thing. They turn themselves at an awkward looking twist and write back-hand.

"Many left-handed children write mirror script naturally and puzzle their teachers who do not know how to read it," Dr. Downey said. "I remember once eyeing in dismay a slate full of figures which meant nothing to me. But when I questioned the six-year-old boy who made them, I found that he knew the answers to all of his problems. Not only had he reversed each digit, but he had put all the answers on the left side of his slate."

The small boy had an illustrious precedent for his Alice-through-the-Looking-Glass writing. Leonardo da Vinci, great painter and scientist, also puzzled his contemporaries and biographers by writing a script that few could decipher. It was this same device of mirror script, as samples of it in existence show. Many speculations have been advanced as to whether da Vinci was left-handed and so n a t u r a l l y wrote reversed script. It is considered true that he had a paralyzed right hand in his late old age. It may be that in earlier years his right hand was injured, and with his usual inventive genius he discovered that he could write more easily with his left hand if he reversed the motion. At any rate, after his discovery he continued to use the mirror script in his secret documents and his will was written in this striking manner.

Medical World Honors Dr. Welch

Medicine

Today's "Dean of American Medicine" Attains 80 Years

WHILE the whole medical world united in honoring Dr. William Henry Welch on his eightieth birthday on April 8, and the President of the United States delivered an address at the Washington celebration, few outside the world of science knew who Dr. Welch is or why he was honored in this way.

Picture to yourself a short stocky gentleman, with head held characteristically on one side; white moustache and Van Dyke; twinkling eyes and kindly smile; a combination of Santa Claus and the world's nicest grandpas rolled into one, whom all his friends and pupils fondly call "popsy"; a man with the brisk stride of a younger generation, with a brilliant mind and outstanding achievements but extreme modesty; that is Dr. Welch.

Known as the dean of American medicine, Dr. Welch himself has made a number of important contributions to science, beginning with the investigations of his student days. But his greatest contribution has been in the field of medical education.

It is largely owing to his influence and efforts that medical education in the United States holds its present high place, equal to that of any other country. Yet some fifty years ago when Dr. Welch was just starting on his career as doctor, it was impossible for a young man to get adequate medical training in this country. Then the practice of medicine was an uncertain, if well-meaning art. Today it is a science of many branches.

Fifty years ago the laboratory was almost unknown in American medical schools. Teaching was almost entirely by lecture. The professors spent only part of their time in teaching, being occupied for the most part with their own private practices.

Today fully half the courses in medical schools are given in the laboratory, and in addition the student has studied chemistry, physics and biology before entering medical school. Now the teachers in at least a few medical schools of the country devote all their time to teaching, and this movement for full-time instruction is gaining ground.

Dr. Welch is our greatest statesman in the field of public health, and his public service to the nation well warrants our appreciation of him. . . .

Our age is marked by two tendencies, the democratic and the scientific. In Dr. Welch and his work we find an expression of the best in both tendencies. He not only represents the spirit of pure science but constantly sees and seizes opportunities to direct its results into service of human kind.

Medicine until modern times was a species of dramatic play upon emotions rather than a science made useful through technology. It combined centuries of experience in trial and error in reactions from many drugs, with a maximum of skill on the part of the practitioner in a kindly art of making the patient feel as hopeful and comfortable as possible while he was dying of the disease, the origin and treatment of which was as yet undiscovered. Providence was made responsible for his fate rather than the bacillus which should never have been allowed to infect him.

Modern medical practice, however, is based upon a vast background of scientific research and discovery. In the creation of this science, in the conversion of its principles into technical methods for use in actual practice, in the diffusion of knowledge of these principles and methods, and in the application of them upon a national and world-wide scale, Dr. Welch has played a leading American part. . . .

No valuable change in everyday practice of any of the great arts has ever been made that was not preceded by the accretion of basic truths through ardent and painstaking research. This sequence that precedes effective action in medicine is equally important in every field of progress in the modern world. It is not the method of stirred public emotions, with its drama of headlines; it is rather the quiet, patient, powerful and sure method of nature herself. . . .—President Herbert Hoover at the Welch Celebration.

Besides his influence on medical education, Dr. Welch has been the teacher and the inspiration of a long line of eminent medical investigators who have done much to increase our knowledge of disease and how to conquer it. He has been the guiding star of the public health movement in this country and abroad.

Hundreds of his students have gone out to campaign for such reforms as better sewer systems, better control of milk and water supplies, and other measures necessary to prevent the spread of disease. Dr. Welch himself through his eagerly sought advice to Presidents, Senators and Congressmen has done much to promote the enactment of laws necessary for the prevention and control of disease and for the betterment of the health of the country. It was through his advice that the Yellow Fever Commission of the United States Army was created, which accomplished the discovery of the role of the mosquito in the spread of yellow fever.

William Henry Welch was born in Norfolk, Conn. His father, four uncles, grandfather and great-grandfather were all doctors. He studied first at Yale, where he received the degree of bachelor of arts, standing third in a class of 111. After a year of teaching he took up his medical studies at the College of Physicians and Surgeons, New York. Later he studied abroad under the most distinguished teachers. Here he learned not only the new facts and theories about diseases which were just being brought forward, but also the modern methods of scientific investigation. It was that important period of medicine when such men as Virchow, Pasteur and Koch were at work on their epochal discoveries.

Back in America again, Dr. Welch found physicians slow to accept these newly discovered medical facts and still clinging to the old theories and old methods.

Dr. Welch's own medical specialty is pathology, that branch of medicine which deals with the nature of disease. When he first started out as a physician, pathology was almost unknown in the United States. The chances of making it a career were extremely slim. Yet when the young doctor returned from abroad, he refused to become a lecturer on pathology at the College of Physicians and Surgeons because he would have no opportunity to set up the laboratory which he considered essential for teaching this and related subjects. However, Bellevue Hospital Medical College prepared a laboratory for him and here he taught for several years, during which time he acquired a high reputation in the medical profession of New York.

When President Gilman of the Johns Hopkins University looked about for a man (*Turn to next page*)

America's Machine Age Has a Birthday—*Continued*

leave still much to be desired from the point of view of automobiles. However, a great scheme of 20,000 kilometers of road improvements to be completed in 10 years is now in course of active realization.

In the meantime several "autostrade" built expressly for rapid transit of automobiles are already in service and more in construction. They are roads very solidly paved and reserved exclusively for automobiles. They are not in direct communication with ordinary roads and they can be entered only at proper places protected by signals like an ordinary railroad. Thus automobiles are free to travel at any speed they like, because the signals protect them from side collisions. It is a new idea which has found great favour with the public.

Switzerland

Dr. A. Stodola of Zurich:

Swiss technical science owes its origin to the economic needs of a country poor in raw materials and dependent upon the scanty yields of its soil. The initiative of far-seeing leaders gifted with creative genius found powerful and encouraging support in the natural liking and ability Swiss people have for technical activity. In early days Switzerland recognized that its very existence depended largely upon the quality of its products being of the very highest, and to live up to this standard is natural to the Swiss character which is averse to all outward show but prizes genuineness in goods and in character. In addition to this the Swiss engineer has instinctively endeavored to impart the stamp of beauty to his designs, a fact which has always been acknowledged by the technical world.

Belgium

From a report by a number of Belgian engineers:

Examples of Belgium's contribution to the technical progress of the world are:

The ammonia process invented by two eminent Belgians, the brothers Solvay. The dynamo invented by Zenobe Gamme of Liege. The first artificial silk factory at Tubize. The first plate glass factory exploiting the Fourcault process. The adoption at Langerbrugge of high-pressure boilers for the production of electric power, proving the possibility of reducing the cost of power by such a margin that electrochemical plants may come down from the mountains to the coal fields. This fact is particularly important for Belgium which controls practically no waterpower.

Scandinavia

Vilhelm Nordstrom of Sweden, representing Scandinavia:

Mechanical engineering has developed rapidly in Sweden and has contributed to the industrial progress of the world on a scale far out of proportion to the number of inhabitants. Even if we leave out many names, we still have a very significant list, including:

The founder of mechanical material testing, Per Lagerhjelm; the inventor of the ball testing method, Johan Brinell; the originator of absolute exactness in mechanical production, E. C. Johansson inventor of the Johansson precision gauge. The name of Gustaf de Laval is well-known in technical circles because of his revolutionary work in increasing the speed, peripherical as well as angular.

In the field of power and heat economy there are the brothers Birger and Frederik Ljungstrom, turbine inventors. Johannes Ruths is the inventor of a new method for the storage of steam. The Swedish Ball Bearing Company, based on S. G. Wingqvist's invention of spherical ball-bearings, now controls 35 per cent. of the world's supply in this field. The Swedish Match Company and the name of its far-seeing leader, Ivar Kreuger, are well known.

The inventions for lighthouses by Gustaf Dalon can be seen all over the world, for instance the installations in the Panama canal. Many other names might be mentioned, such as that of Alfred Nobel. We honor as the ideal mechanical engineer, John Ericsson.

Denmark's industrial development is based on a decidedly scientific foundation, and names such as Tycho Brahe and H. C. Orsted, the discoverer of electro-magnetism, give a certain splendor to this phase of Denmark's contributions to scientific industrial research.

South America

Prof. Donato Gaminaro, of Uruguay, representing South America:

Like youth that develops in an environment full of difficulties to be met, where great activity is called for and the prospects are bright, South American engineers have matured rapidly until now they are the real leaders in political and social life. Today in South America there are engineers in the presidency of Republics, in the presidency of universities, as members of Congress, and in other high places. The countries of South America are developing rapidly and engineering must necessarily be one of the greatest factors in their progress.

Austria

Hofrat Ing. Ludwig Erhard of Vienna:

Austria is still in the heart of Europe. This geographical position still provides us with natural advantages, and even in this dark period of our existence Vienna's culture and beauty are maintaining the reputation and tradition of centuries. Our cultural mission is deep-rooted and of real importance to the civilization of Central Europe. Whether or not we can maintain it in the future will depend to a great extent on the economic development of our country. With humble pride, the engineer engaged in our economic restoration finds himself at work on one of the most serious problems of European culture.

Dr. Welch—*Continued*

to guide the new medical school of the university, he was advised by eminent European professors that he could find no one better suited to the task than the young Dr. William Henry Welch. As a result, Dr. Welch became the first professor of pathology and first dean of the Johns Hopkins Medical School. In 1916 he was appointed Director of the School of Hygiene and Public Health, a position he held for ten years, although his duties as director were at first interfered with by his war service. Since 1926 he has been Professor of the History of Medicine at Johns Hopkins.

While he has remained unknown to the general public the world of science has long recognized his ability and achievements, and has bestowed countless honors and degrees upon him. Yet he is one of the most modest of men. Much of his accomplishment has been due to his charming but forceful personality which has won loyal followers to his standards and ideas.

Chemists Accurately Analyze Specks

Chemistry

Spectroscope Begins to Show Quantitative Make-up

THE classical picture of a chemist as a man peering at a test-tube or anxiously watching a precipitate form in a beaker must now be varied to show him in the role of a wielder of invisible radiations or a watcher of artificial rainbows.

The newer methods of analysis, including X-ray analysis, spectrum analysis, micro-analysis and many other modern refinements and innovations, are such as to leave the man who "took chemistry" a few years ago but who has not paid much attention to it since, floundering and gasping. These new methods were described at the recent meeting of the American Chemical Society in Atlanta.

Where the older chemist needed whole ounces of material before he could make an analysis, his modern descendant can often get even more accurate results with a speck of stuff no bigger than a pinhead. He puts the material to be analyzed under a microscope instead of a test-tube, and through the magic eye of that instrument sees the effects of the reagents he applies multiplied a thousand-fold.

Watching rainbows used to be the most visionary of occupations, but the modern chemist, watching through his spectroscope the glowing streaks given off by an ignited "unknown," can dissect its chemical makeup as accurately as the anatomist with his scalpel can take apart a fish or frog. Beginnings in spectrum analysis were made long ago, but these were only qualitative: they told what was in a given sample of material, but did not answer the question, "how much?" which is basic to all industrial processes as well as to a great deal of "pure" chemistry. Now the magic rainbow-tube of the chemist is beginning to be able to weigh the parts of the things it is called upon to analyze.

XYLOSE, a sugar made from woody stuff, may come to figure as largely in American industry as its chemical cousin cellulose now does. A commercially practicable means of manufacturing it out of cottonseed hull bran, now a very low-value by-product of the cottonseed industries, has been worked out at the U. S. Bureau of Standards. It was discussed by one of the group of scientists who developed it, Dr. W. T. Schreiber.

Although xylose has almost the same chemical makeup as glucose, lactose and other food sugars, it is not expected to play its most important role as a food. It can be fermented into a variety of materials useful in industry, especially alcohol and such solvents as acetone, lactic acid and acetic acid. By other manipulations it can be turned into a basis for dyestuffs and food colors.

Transformed into an allied substance, xylite, it may be treated as cellulose is treated to make guncotton, resulting in a new explosive which might be called nitroxylite.

Although the possible use for xylose as food is not large in bulk, it may be important nevertheless. It is not as sweet as common cane or beet sugar, but it has a definitely sweetish taste, and it may therefore turn out to be useful in the diet of diabetics, who cannot tolerate ordinary forms of sugar. Xylose appears to be harmless to diabetics.

Xylose has been an expensive laboratory possibility for a long time, but its preparation from agricultural waste on a large scale makes it an important industrial novelty. The Bureau of Standards group that developed it includes S. F. Acree, who originated the present process for its manufacture, W. L. Hall, Max Bradshaw, Fred Acree, W. T. Schreiber, Klare Mackley, R. C. Geib, W. Eckhardt, Baker Wingfield, C. S. Slater and G. M. Kline.

A NEW gas for the cells of electric refrigerators was demonstrated at the opening sessions of the Chemical Society meeting. It is non-poisonous and non-inflammable, and it very closely approaches the refrigerating engineer's notion of an ideal substance for the purpose.

The new gas is a compound of carbon, chloride and fluorine, and is a chemical cousin to carbon tetrachloride, widely sold under a variety of trade names and used for such diverse purposes as grease-spot remover, fire extinguisher and insect exterminator. As a matter of fact, carbon tetrachloride is one of the two ingredients that are used in making it, the other being a less-known compound, antimony fluoride.

The new refrigerant is the invention of Thomas Midgley, Jr., famous as the developer of ethyl gasoline, and a Belgian chemist, Dr. A. L. Henne.

It is as completely non-toxic as carbon dioxide, which we have in our lungs all the time as the result of our breathing and which we swallow whenever we drink any kind of carbonated beverage. It is also completely non-inflammable; even with the addition of 30 per cent. of butane, an exceedingly explosive gas, the mixture refused to ignite.

WHERE does iodine in Kentucky rainwater come from? Dr. J. S. McHargue and Dr. W. R. Roy of the Kentucky agricultural experiment station asked their fellow-chemists this question at the Chemical Society meeting, but did not offer to answer it.

Iodine in natural waters of inland regions has figured importantly in public-health work since the discovery of its importance in preventing goiter. In regions near the sea, it is assumed that the iodine in natural waters comes from sea-water spray flung into the air and evaporated into clouds. But Kentucky, Dr. McHargue pointed out, is 500 miles from the nearest point on the sea.

Iodine does not seem to be present as a gas in the air. Dr. McHargue made a critical chemical test of the air, bubbling it through a solution that should have detected the element if present even in minute quantities, and got no results. The source of iodine in Kentucky rainwater remains a mystery.

However, Dr. McHargue concluded, recent investigations indicate that forage crops and vegetables grown in his state contain appreciable amounts of iodine. There are no known areas in Kentucky where goiter is more prevalent than in other parts. Apparently the iodine content of natural waters and foods produced in Kentucky is adequate for the normal growth and metabolism of animals.

SCANDINAVIAN paper manufacturers can produce more cheaply than their American competitors. Each year they ship 6,000 tons of kraft wood pulp more than 4,000 miles to the southeastern states and sell it for less than the same kind of pulp made from the abound- (*Turn to page* 238)

NATURE RAMBLINGS

By Frank Thone

Sailfish

WHEN we have a President who is also an angler—which happens about once in a generation—he is apt to have a favorite brand of fish. Members of the portlier generation can remember Grover Cleveland's preference for trout. Calvin Coolidge caught trout also, but the fish he made famous was a perch. Now, with a second angler-President in immediate succession, we find Herbert Hoover going in for bigger game and having his luck with sailfish. Both on his pre-inauguration trip to South America and recently off the coast of Florida he brought to gaff first-class specimens of this strangely-shaped, hard-fighting fish.

Sailfishes (there are several species) are related to the swordfishes, as witness their long upper jaw, projecting into a formidable beak. Like the swordfishes, they are big fish. The kind President Hoover went after is the most northerly-ranging and the smallest, reaching a length of six feet and a weight of 150 pounds. There is one tropical species that gets to be more than half again as large.

The various species of sailfish are pretty strictly tropical or at most subtropical. The President's fishing waters, off Lower California and southern Florida, represent about as far north as they choose to run. Occasional specimens have been taken as far up the coast as Savannah and Norfolk.

Being large fish they require much food. Being swimmers in the open and not bottom feeders they require speed and agility in order to pursue the smaller fish on which they prey. Hence the flaring tail and the great sail-like dorsal fin. Hence also the long, almost wing-like pectorals.

Science News-Letter, April 12, 1930

Chemistry—*Continued*

ing pine forests in this section. These economic facts were presented by Prof. Lauren B. Hitchcock, of the University of Virginia.

"New and economical methods of manufacturing wood pulp from southern pines must be perfected by American research chemists in order to meet foreign competition," Prof. Hitchcock declared. "It should be possible in the middle of a southern pine area, with as staple and satisfactory a labor supply as can be found in America, to profitably manufacture kraft pulp and deliver it a few miles away at some different amount, however small, below the price asked by foreign manufacturers after a 4,000 mile water shipment."

Kraft pulp is used in the manufacture of strong wrapping papers, and is the staple product of southern mills. Virginia, whose rate of industrial growth in recent years has exceeded that of other states, can fairly credit her success to wood pulp and cotton linters. A large portion of the state's industries, both old and new, involve chemical processes, and 65 per cent. of these are based on cellulose, said Prof. Hitchcock.

"Although Virginia's twelve mills are situated in a region generally regarded solely as a kraft district, the average value per ton of their product is exceeded by only two other states, Massachusetts and New Hampshire, large writing-paper producing districts," said Prof. Hitchcock.

Among Virginia's mills is the first ever built to manufacture a type of cardboard from chestnut chips.

Science News-Letter, April 12, 1930

New Names

To Cobh and Oslo add Istanbul, Gelibolu and Ankara. The Turkish Government has announced its official ways of spelling many names of cities and other geographic features, according to advices received here by the United States Geographic Board. And they add to the strangeness of the post-war map, agreeing not at all with the names that used to be in the geographies when we were children.

Constantinople, the Greek name chosen by the Roman emperor who built the city centuries ago, becomes Istanbul. Gallipoli, the scene of one of the most epic struggles in the history of warfare, is re-spelled Gelibolu. Angora, seat of the present Turkish Government, will henceforth be known as Ankara.

Geography

Science News-Letter, April 12, 1930

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of SCIENCE NEWS-LETTER published weekly at Baltimore, Md., for April 1, 1930.

Washington } ss.
District of Columbia }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Watson Davis, who, having been duly sworn according to law, deposes and says that he is the Editor of the SCIENCE NEWS-LETTER and that the following is, to the best of his knowledge and belief, a true statement of the ownership, managment, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:
Editor, Watson Davis, 21st and B Sts., N. W., Washington, D. C.

2. That the owner is:
Science Service, Inc., Washington, D. C., a non-profit making corporation and science institution.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent. or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appear upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

Watson Davis,
Editor.

Sworn to and subscribed before me this 1st day of April, 1930.

[SEAL]

Charles L. Wade.

(My commission expires April 6, 1933.)

Synthetic Alcohol Not Yet Needed

Chemistry

Low Molasses Tariff Prevents Change of Process

CONGRESS has decided not to force the synthetic manufacture of alcohol in this country by means of a prohibitive tariff on blackstrap molasses, formerly used for making rum but now the chief source of industrial alcohol.

In spite of efforts of certain senators and representatives from the agricultural districts, among which was Senator Brookhart of Iowa, to boost the rate on Cuban blackstrap molasses to a figure such as eight or five cents per gallon, the rate has been raised only from one-sixth cent to one-third cent.

The surplus corn crop of Iowa and other corn-belt states has been the motivating factor behind the efforts of Senator Brookhart and others to raise the blackstrap rate. It was held that corn sugar might just as well be used for the production of industrial alcohol.

Those who opposed this theory declared that it would be too expensive to use corn for this purpose and pointed out costs of rail transportation from the corn belt to coast-situated industrial alcohol factories. Instead of using corn, these factories would turn to the synthetic process of making alcohol as is done in Germany, it was said.

Numerous processes are known by which alcohol can be made from coal, lignite, petroleum or natural gas.

While the synthetic process was being developed, however, opponents of the high molasses tariff declared users of industrial alcohol would be subjected to such high costs (under an eight or five cent tax) that the 25,000 manufacturers of cosmetics, perfumes, paints, varnishes, lacquers, artificial silk, and many other substances, would be hamstrung in their industrial expansion.

A recent monograph published by the Bureau of Prohibition of the Treasury Department pointed out that grain alcohol costs 10 to 15 cents more per gallon to manufacture than molasses alcohol.

This publication pointed out that it was only during the World War and since then that the United States has so greatly expanded in the use of industrial alcohol. Many dyes, pharmaceuticals, and chemical specialties formerly obtained from Germany are now manufactured at home, the Prohibition Bureau explains. The use of industrial alcohol in this country has risen from one million gallons per year in 1906 to one hundred times that amount or 100,000,000 gallons at the present time.

"Cheap industrial alcohol is absolutely essential to an active chemical industry that may successfully compete in the world market," the statement reads.

It is now known that during the past year the Treasury Department of the United States granted a temporary permit to a chemical corporation to experiment with the process of making synthetic ethyl alcohol from ethylene. The experiment was so successful, it is understood, that only the possible problem of reducing costs of manufacture remains to be solved. The Treasury Department comments on the experiment, stating that "if the cost of production is no greater than the fermentation processes now being used, the quantity that can be produced is only limited by the quantity of coal and petroleum oils available."

Science News-Letter, April 12, 1930

Plants See Without Eyes

Biology-Physics

ALTHOUGH plants have no eyes to see with, they can distinguish between different colors of light, and they paradoxically indicate their choice by bending toward the radiation that they find hardest on their growth. This preference by plant protoplasm is being explored by scientists at the Smithsonian Institution in Washington, as a part of a program of research on the influence of radiation on living things sponsored by Dr. Charles G. Abbot, secretary of the Institution.

The group immediately concerned with the work is led by Dr. F. S. Brackett, physicist, and Dr. E. S. Johnston, plant physiologist. In one of the laboratory rooms they have arranged a dark chamber with an electric lamp at either end, its light passing through a color screen. A young plant is placed between the two, at a point where the energy of the opposing light-beams has been instrumentally determined as being exactly equal.

The plant thus finds itself in the position of the donkey exactly midway between two haystacks, which medieval philosophers are said to have argued about. Which will it choose? The way out of the dilemma is as though the donkey had found himself between a stack of timothy hay and one of clover: there is a qualitative choice. All kinds of visible lights seem to have a retarding effect on plant growth, but some have more than others; and the plant grows less on the side exposed to the more growth-retarding of the two beams, and therefore grows toward it, being pushed over by its more rapidly-growing side.

Red light, and the short-wave infra-red, the Smithsonian experiments have shown, have very little effect on growth. Yellow light still has little effect, though more than red. But the green sector of the spectrum has a powerful influence, and the blue-violet group of wavelengths are stronger still in causing growing plant-tips to bend.

The work, Dr. Brackett informed Science Service, is still in its preliminary stages, and only broad groups of wavelengths have so far been used. Apparatus is now being made that will enable the experimenters to split white light up into much more finely subdivided individual beams, and thereby make possible a much more exact test of the effect of each separate wavelength throughout the spectrum.

The research on the color likes and dislikes of growing plants is only a small part of the work projected by the Smithsonian Institution. Eventually the experimenters hope to get at some of the secrets of the mechanism by which the chlorophyll of green leaves uses sunlight to combine carbon dioxide and water to make sugar. But the barest beginnings of an understanding of the structure of these complex living molecules have yet to be worked out.

Science News-Letter, April 12, 1930

FIRST GLANCES AT NEW BOOKS

THE NEW WORLD OF PHYSICAL DISCOVERY — Floyd L. Darrow — *Bobbs-Merrill*, 371 pp., $3.50. In this book, Mr. Darrow has produced an excellent popular summary of modern physical science. No mathematical knowledge is needed to read it, for he has managed to avoid mathematics and technical terms completely. Obviously, with such a limitation, anything like an exhaustive treatise is impossible, but to one who lacks either the knowledge or inclination to plow through the vast amount of technical literature in which they were originally developed, this book affords a means of making the casual acquaintance of modern physical theories. Bohr's ideas of the atom, Planck's quantum theory, the relativity theory of Einstein, the wave mechanics of de Broglie and Schrödinger, the work of Aston and others on isotopes; these are among the important physical developments that Mr. Darrow describes.

Physics

Science News-Letter, April 12, 1930

METEOROLOGY FOR AVIATOR AND LAYMAN—Richard Whatham—*Stokes*, 179 pp., $3. With the increasing popularity of aviation, knowledge of weather science is becoming more important than ever. This book summarizes the main points in such a way that it will also be of interest to the man on the ground who wants to know more about what is happening above him.

Meteorology

Science News-Letter, April 12, 1930

CHILDREN IN THE NURSERY SCHOOL—Harriet M. Johnson—*John Day*, 325 pp., $3. For readers who want to know what an experimental nursery school does with its children, and why, and how. Miss Johnson is director of an experimental school for children fourteen to thirty-six months old, which is associated with the Bureau of Educational Experiments. Besides explaining methods of handling the children, she gives considerable space to the planning of the child's environment, and to the keeping of records.

Psychology—Education

Science News-Letter, April 12, 1930

ALGEBRAIC EQUATIONS—Edgar Dehn—*Columbia Univ.*, 208 pp., $4.25. An introduction to the theories of Lagrange and Galois.

Mathematics

Science News-Letter, April 12, 1930

THE NORTH POLE OF THE WINDS—William Herbert Hobbs—*Putnam*, 376 pp., $5. According to Prof. Hobbs, who is professor of geology at the University of Michigan, the north pole of the winds is the interior ice cap of Greenland, and there, he believes, the weather of a large part of the northern hemisphere originates, especially of the North Atlantic Ocean. In order to study the conditions there he made several expeditions to Greenland, which are described in this book. He tells many interesting facts about the lives of the members of the party, including the rescue of Hassell and Cramer when their ill-fated trans-Atlantic flight in the "Greater Rockford" came to grief in Greenland.

Meteorology

Science News-Letter, April 12, 1930

SLEEP — Donald A. Laird and Charles G. Muller—*John Day*, 214 pp., $2.50. Results of the scientific experiments on sleep carried out by the head of the psychological laboratory at Colgate University. The book is written in popular style and will be interesting to a large number of people. A small reading lamp which may be attached to a book, presumably of the type suggested by Dr. Laird, is included in the purchase price and is boxed with the book when bought.

Psychology

Science News-Letter, April 12, 1930

GEORGE EASTMAN—Carl W. Ackerman—*Houghton, Mifflin*, 522 pp., $5. An interesting biography of the man who brought photography into our daily lives. Had the work been read in advance by an experienced photographer, some technical errors might have been avoided, such as "it was vital to both the developing and fixing of a negative that all traces of 'hypo' be thoroughly washed away before the film was immersed in fixing fluids."

Photography—Biography

Science News-Letter, April 12, 1930

SHATTERING HEALTH SUPERSTITIONS—Morris Fishbein—*Horace Liveright*, 245 pp., $2. Dr. Fishbein, editor of the Journal of the American Medical Association and of Hygeia, debunks a number of old notions about health and disease in this medical Believe It or Not. Entertaining and informative.

Hygiene

Science News-Letter, April 12, 1930

THE MAGIC OF THE STARS—Maurice Maeterlinck—*Dodd, Mead*, 146 pp., $2.50. Some facts and much speculation by this eminent writer, who is not hampered by a too-extensive knowledge of the subject. He suggests, for instance, that strange happenings in history might be caused by the earth passing through "zones of ether charged with electrons from constellations perhaps with a nobler civilization than our own; sailing round worlds wherein forces may have assembled that are more active and purer, perhaps even more human, than on any other orb in the sky."

Romance

Science News-Letter, April 12, 1930

PHYSIOGRAPHY LABORATORY SHEETS—Willard B. Nelson—*Globe*, 46 pp., 68c. Loose leaf sheets for laboratory work in physical geography, in which the necessary coordinate paper, outline maps, etc., are provided.

Physiography

Science News-Letter, April 12, 1930

NEW FRONTIERS OF PHYSICS—Paul R. Heyl—*Appleton*, 184 pp., $2. So rapidly is modern physics advancing that it is difficult to keep abreast of its latest developments, but here is a small book that describes the main frontiers along which these advances are being made. Dr. Heyl, who is a physicist at the U. S. Bureau of Standards, is eminently well qualified to write about them. After tracing the history of physics during the nineteenth century, before the revolution that came at its end, he brings the reader to the modern era, with its correlation of electricity and matter. Here he outlines the concepts of de Broglie, Schrödinger and others, and then the theories of Einstein. Though admitting the difficulty that these present "even to the physicist with more than average mathematical equipment," he gives a very lucid account of some of their more simple aspects. In the concluding parts, he anticipates a further correlation of phenomena that the older physics regarded as entirely independent, approaching nearer and nearer the goal of an all-inclusive law completely covering the entire field. The book, one of the "Appleton New World of Science Series," edited by Watson Davis on behalf of Science Service, has been "highly recommended" by the Scientific Book Club.

Physics

Science News-Letter, April 12, 1930